



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/557,695	12/22/2005	Eric Chevalier	2590-144	7840
23117 7590 03/16/2010 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203				
EXAMINER				
ALEJANDRO MULERO, LUZ L				
ART UNIT		PAPER NUMBER		
1792				
MAIL DATE		DELIVERY MODE		
03/16/2010		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/557,695

Applicant(s)

CHEVALIER ET AL.

Examiner

Luz L. Alejandro

Art Unit

1792

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 6/15/09 and 11/16/09.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 4-9, 12, 14-27 and 30-32 is/are pending in the application.
- 4a) Of the above claim(s) 4, 9, 15-19, 22-24, 26, 27 and 31 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 5-8, 12, 14, 20, 21, 25, 30 and 32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-940)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 11/22/05
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of species A of group 1 and species D of group 2 in the reply filed on 06/15/09 is acknowledged. The traversal is on the ground(s) that there is no undue burden due to the presence of generic claim 1. This is not found persuasive because the presence of the generic claim is irrelevant as to whether there is an undue burden upon the examiner because the elements of the species require different search and examination which places a burden upon the examiner.

The requirement is still deemed proper and is therefore made FINAL.

Specification

The abstract of the disclosure is objected to because it contains more than a single paragraph. Correction is required. See MPEP § 608.01(b).

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 32 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification, as originally filed, does not provide support for "wherein the apparatus is adapted such that the antenna has a sinusoidal current distribution in function of the azimuthal angle. Correction is required.

Claims 30 and 32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 30 recites the limitation "the RF shield" in line 1. There is insufficient antecedent basis for this limitation in the claim.

In claim 32, it is not understood what is meant by the antenna having "a sinusoidal current distribution in function of the azimuthal angle". Clarification is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-2, 5, 8, 12, 21, 25, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett, U.S. Patent 6,495,963 in view of Campbell et al., U.S. Patent 4,990,229 and Kwon et al., US 2002/0189763 or Howald et al., U.S. Patent 6,441,555.

Bennett shows the invention substantially as claimed including a plasma source apparatus comprising: an antenna; a plasma generation chamber 11 in the proximity of the antenna; a fluid injector for introducing at least one fluid into the plasma generation chamber; a radio frequency generator with continuous or pulsed RF power supply,

wherein: said antenna comprises at least two conductive loop elements 13a surrounding and spaced along a common longitudinal axis and at least a pair of axial conductive elements (14a,14b) electrically interconnecting said conductive loop elements (see figs. 9-13 and their descriptions).

Bennett does not expressly disclose that the apparatus comprises magnetic field generators arranged around the antenna. Campbell et al. discloses a plasma source apparatus whereby magnetic field generators 16,17,33,34,76,77,103,104 are arranged around an antenna (see figs. 6, 9, 12, and 14-16 and their descriptions). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Bennett so as to include the claimed magnetic field generators around the antenna because in such a way the plasma in the processing chamber can be precisely controlled.

Bennett and Campbell et al. do not expressly disclose each of the conductive loop including at least one capacitor. However, Bennett discloses an embodiment in which the loop includes capacitors (see figs. 9 and 21 and their descriptions). Furthermore, Kwon et al. discloses inserting capacitors into an antenna (see figs. 2a-2b and 4a-4c and their descriptions). Moreover, Howald et al. also discloses inserting capacitors into an antenna coil. In view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Bennett modified by Campbell et al. so as to include the claimed capacitor because in such a way a plasma of uniform density with low capacitive coupling can be achieved.

With respect to claim 2, note that only said conductive loop elements include at least one capacitor.

Concerning claim 5, note that the apparatus of Bennett comprises several axial conductive elements, each axial conductive element interconnecting said conductive loop elements.

Regarding claim 8, the apparatus of Bennett comprises a matching network interconnecting the radio frequency generator and the antenna in such a way as to promote optimal transfer of radio frequency energy from the radio frequency generator to the antenna.

With respect to claim 12, note that in the apparatus of Bennett modified by Campbell et al. and further modified by Kwon et al. or Howald et al. the capacitors are tunable.

Concerning claim 21, note that the apparatus of Bennett comprises a network of antennas wherein adjacent pairs of conductive loop elements have at least one common axial conductive element.

Claims 6 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett, U.S. Patent 6,495,963 in view of Campbell et al., U.S. Patent 4,990,229 and Kwon et al., US 2002/0189763 or Howald et al., U.S. Patent 6,441,555 as applied to claims 1-2, 5, 8, 12, 21, 25, and 32 above, and further in view of Saito et al., U.S. Patent 5,728,253 or Durr, U.S. Patent 5,180,949.

Bennett, Campbell et al., Kwon et al., and Howald et al. are applied as above but do not expressly disclose the claimed antenna cooling means or the axial or conductive loop elements being constructed of the claimed wire. Saito et al. discloses a plasma apparatus comprising a hollow wire antenna with a heat pipe in the middle in order to cool the antenna (see figs. 23-24 and their descriptions). Alternatively, Durr discloses a plasma apparatus comprising a hollow wire antenna with a heating pipe located in the center of the wire to cool the antenna (see col. 3-lines 45-55). In view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Bennett modified by Campbell et al. and Kwon et al. or Howald et al. so as to include the claimed antenna cooling means and the claimed wire of the antenna because in such a way an effective plasma can be produced while preventing damage to the coil.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett, U.S. Patent 6,495,963 in view of Campbell et al., U.S. Patent 4,990,229 and Kwon et al., US 2002/0189763 or Howald et al., U.S. Patent 6,441,555 as applied to claims 1-2, 5, 8, 12, 21, 25, and 32 above, and further in view of Collins et al., U.S. Patent 6,024,826.

Bennett, Campbell et al., Kwon et al., and Howald et al. are applied as above but do not expressly disclose thermal control means of the plasma generation chamber. Collins et al. discloses thermal control means of the plasma generation chamber (see, for example, fig. 2 and its description). In view of this disclosure, it would have been

obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Bennett modified by Campbell et al. and further modified by Kwon et al. or Howald et al. so as to include the claimed thermal control means because in such a way processing within the plasma apparatus can be accurately controlled.

With respect to using the thermal control means in order to avoid thermal shock between the inside and the outside of the plasma generation chamber during plasma ignition, the limitation is directed to a method limitation instead of an apparatus limitation, and since an apparatus is being claimed as the instant invention, the method teachings are not considered to be the matter at hand, since a variety of methods can be done with the apparatus. The method limitations are viewed as intended uses which do not further limit, and therefore do not patentably distinguish the claimed invention. The apparatus of Bennett modified by Campbell et al. and Kwon et al. or Howald and Collins et al. is capable of avoiding thermal shock between the inside and the outside of the plasma generation chamber during plasma ignition.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett, U.S. Patent 6,495,963 in view of Campbell et al., U.S. Patent 4,990,229 and Kwon et al., US 2002/0189763 or Howald et al., U.S. Patent 6,441,555 as applied to claims 1-2, 5, 8, 12, 21, 25, and 32 above, and further in view of Hashimoto, U.S. Patent 6,096,232 or Okumura et al., U.S. Patent 5,888,413 or Yoshida et al., U.S. Patent 5,690,781.

Bennett, Campbell et al., Kwon et al., and Howald et al. are applied as above but do not expressly disclose wherein at least one of the conductive loop elements is

movable. Hashimoto discloses an apparatus which comprises an antenna that is movable (see fig. 6A and 10 and their descriptions). Alternatively, Okumura et al. also discloses a plasma apparatus which comprises an antenna which is movable (see figs. 1 and 17-19 and their descriptions). Moreover, Yoshida et al. discloses a plasma apparatus that includes an antenna that is movable (see figs. 6A and 10 and their descriptions). In view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Bennett modified by Campbell et al. and further modified by Kwon et al. or Howald et al. so as to have at least one of the conductive loops to be movable because in such a way the plasma distribution in the chamber can be precisely controlled.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett, U.S. Patent 6,495,963 in view of Campbell et al., U.S. Patent 4,990,229 and Kwon et al., US 2002/0189763 or Howald et al., U.S. Patent 6,441,555 as applied to claims 1-2, 5, 8, 12, 21, 25, and 32 above, and further in view of Savas et al., U.S. Patent 5,811,022.

Bennett, Campbell et al., Kwon et al., and Howald et al. are applied as above but do not expressly disclose wherein the RF shield is adapted to define or to adjust in real time optimal electromagnetic coupling between the antenna and the plasma. Savas et al. discloses a plasma apparatus whereby an RF shield is adapted to define or to adjust in real time optimal electromagnetic coupling between the antenna and the plasma (see col. 4-lines 37-57). In view of this disclosure, it would have been obvious to one of

ordinary skill in the art at the time the invention was made to modify the apparatus of Bennett modified by Campbell et al. and Kwon et al. or Howald et al. so as to include the claimed RF shield because in such a way the capacitance of the plasma can be precisely controlled.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Luz L. Alejandro/
Primary Examiner, Art Unit 1792

March 11, 2010